

Probing Cellular Basis of Health

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IN THE LAST 25 YEARS, the major concern of medical science and the public it serves has shifted from infectious disease to a host of killers with little understood pedigrees—genetic and immunological—that are pushing researchers to the limits of



their knowledge in the search for solutions. Today's priority health problems, such as heart disease, cancer, and psychiatric illness, are rooted deeply in the molecular and cellular structure of the human organism, a thousand times more complex than the microbes we have as targets in infectious disease. Our hopes for major advances in the control of these killers depend on broadening our knowledge in the most fundamental biological disciplines, in particular the study of DNA, identified as the genetic material by Rockefeller scientists 40 years ago, and proteins. Almost everything we attempt in rational medicine is connected with the structure and behavior of the approximately 100,000 categories of human proteins and the myriad genes which order their production.

Until about 10 or 15 years ago, our methods enabled us to make only crude guesses at the ordering of these master molecules of life. Today, news of DNA pervades the stock market and the science sections of the newspapers. The news reflects the confidence and energy of investigators who are rapidly developing new biological tools to obtain more and more profound insights into the processes underlying disease mechanisms.

In the words of Lewis Thomas, "a good many of the mysteries are beginning to look penetrable." No prophecy can be safe: but all of the crucial disease threats to human life are now within the reach of fundamental molecular and cellular investigation.

This sort of investigation is precisely the main core of the scientific program at The Rockefeller University and its hospital. The hospital this year marks its 75th anniversary as the nation's first clinical research center. More than 15 laboratories are doing research relevant to cancer. Their multidisciplinary effort focuses on the biochemical and molecular functions of the cell, the influence of heredity, and the role played by environmental factors.

One of the most important steps forward in cancer research in the past decade was the identification of cancer genes—oncogenes, a discovery to which Rockefeller scientists contributed.

Research related to heart disease is conducted in approximately 10 laboratories where scientists are studying cholesterol metabolism, arteriosclerosis, and behavioral factors contributing to heart disease. They are also seeking the causes of irregular actions of the heart and methods of treating and preventing them.

A third of the University's 55 laboratories are at work on problems related to the neurosciences. As this research advances our knowledge of the brain, scientists hope it also will yield clues to the prevention and treatment of psychiatric disorders and diseases of the brain and nervous system. A current animal behavior study at Rockefeller is revealing tantalizing insights into the mechanism of nerve regeneration.

Other laboratories are carrying on the University's rich tradition in immunology, studying immune deficiency and such disorders as rheumatoid arthritis and lupus. The science of immunogenetics was essentially born at Rockefeller. Research also is directed to the effects of stress on the immune system and to the key cells of immunity. The structure of immunoglobulin, the central molecule of the immune system, was first elucidated at the institution 20 years ago.

This far-from-complete summary of research projects related to the major medical problems of the day attests to The Rockefeller University's continuing commitment, extending back to its founding in 1901 as the Rockefeller Institute for Medical Research, to building the base of rigorous scientific knowledge essential to practical health advances. As the war on infectious and parasitic diseases has taught us, the human benefits from a scientifically informed strategy are incalculable.

No account of today's major challenges to medicine would be complete without noting that one new concern is a very old one. As Legionnaires' disease and other outbreaks warn us, we have not seen the last of the threats to health from microbes. Most virus infections still defy systematic treatment. Parasites are still the most serious scourges in vast areas of the world. Here, too, Rockefeller scientists are engaged—in the unfinished business of bacteriology, virology, and parasitology. One of the most significant achievements was the development of a method for culturing the human malaria parasite in vitro, a prerequisite to producing a vaccine.

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